

EXPERT REPORT OF JAMES S. SMITH, PH.D., CPC

Prepared for:

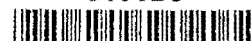
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USEPA, 1982, "Fate of Priority Pollutants in Publicly Owned Treatment Works," EPA/440/1-82/302, PB82-263880, Effluent Guidelines Division, USEPA, Washington, D.C.

5. **OPINIONS AND CONCLUSIONS**

- a. The Ventron/Velsicol Site (the "Site"), Wood-Ridge/Carlstadt, New Jersey, is a 38 acre parcel consisting of developed, filled but undeveloped, and marsh lands. Numerous streams infiltrate and exfiltrate the land and marsh areas, and the land mass borders tidal waters.
- b. Industrial practices since the 1920's on and around the Site have contributed to the current chemical contamination at the site.
 - 1) The northern portion of the Site was the location of a mercury processing plant.
 - 2) The Site has been and is subjected to run off from the developed areas surrounding the site.
 - 3) The filled but undeveloped area of the Site has been subjected to filling with various materials from various sources containing chemicals of concern.
- c. Soil and water samples collected from the Site were contaminated with various inorganic and organic materials and compounds. These chemical species included:
 - 1) Metals including arsenic, manganese, and zinc.
 - 2) Carcinogenic polyaromatic hydrocarbons (PAHs) including benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene
 - 3) Phthalates including bis(2-ethylhexyl) phthalate, butylbenzyl phthalate, diethyl phthalate, dimethyl phthalate, di-n-butyl phthalate, and di-n-octyl phthalate
- d. Former operations on the adjoining properties contributed to the contamination on the Ventron/Velsicol site.
 - 1) The production pond on the Diamond Shamrock/Henkel property was a source of the contaminants on the Ventron/Velsicol site.
 - a) Prior to 1970, most of the wastewater on the Diamond Shamrock/Henkel property was disposed of in the production pond.
 - b) A storm sewer inlet on the east side of the pond allowed runoff from the developed areas of the property to enter the production pond.
 - c) A ditch on the southern side of the pond allowed flow from the Arsynco property to enter the production pond.
 - d) More likely than not, dissolved contaminants and contaminants adsorbed onto suspended particles were released from the production



pond to the Diamond Shamrock/Henkel inlet ditch during tidal actions prior to installation of the tidal gate. Transport of contaminated suspended particles was, more likely than not, facilitated by the presence of surfactants which were major products of Diamond Shamrock/Henkel.

- e) These contaminants included zinc, arsenic, and manganese.
 - (1) Diamond Shamrock/Henkel used zinc dust in their sodium hydrosulfite process, and zinc hydroxide was a byproduct of that process. The zinc hydroxide was included in the waste calcium sulfate that was disposed of in the pond.
 - (2) Relatively high concentrations of zinc were found in the southwestern portion of the Ventron/Velsicol site primarily along the unnamed ditch between the Diamond Shamrock inlet and outlet ditches (Exhibit 1). Some high concentrations were also found between the outlet ditch and the midportion of the filled undeveloped area.
 - (3) The observations of arsenic in soil tend to be concentrated in the area between the Diamond Shamrock inlet and outlet ditches in the southwest area of the site (Exhibit 2). The highest concentrations were found in the unnamed ditch between the two ditches. The lack of arsenic in the northern portion of Berry's Creek suggests that the source of arsenic is not from operations in the northern portion of the Site. Consequently, the arsenic contamination is likely due to runoff from the vicinity of the Diamond Shamrock/Henkel property and is associated with the zinc contamination.
 - (4) Elevated concentrations of manganese were detected exclusively in the area between the Diamond Shamrock/Henkel inlet and outlet ditches (Exhibit 3) and appear to be associated with the arsenic and zinc contamination emanating from the vicinity of the Diamond Shamrock/Henkel property.
 - (5) Outflows from the Diamond Shamrock/Henkel property were routed through the southwestern portion of the Ventron/Velsicol site into the ditch referred to as the Diamond Shamrock outlet ditch (north). More likely than not, metals contamination along the outlet ditch was due to the outflow from the Diamond Shamrock/Henkel property.
- 2) From 1968 to 1974, four onsite basins (Equalization, Alternate, North, and South Basins) were used for the holding of production wastewater.
 - a) These ponds accumulated inorganic and organic chemical contaminants over the years of use including metals and PAHs.



- b) Bottom sludges from these basins were excavated and disposed of across the property line onto the Ventron/Velsicol property contaminating the area with carcinogenic PAHs.
- c) PAHs were found distributed throughout the Site (Exhibit 4).
 - (1) The higher concentrations of PAHs were observed along the property line in the area southeast of the Diamond Shamrock/Henkel property line with Ventron/Velsicol by Exponent (SS-36, SS-29, TP-18, and TP-14) and IT Corporation (B-153).
 - (2) Aerial photography (1957, 1959, 1961, 1966, and 1973) showed this area to be impacted with material from the Diamond Shamrock/Henkel property.
 - (3) PAHs were present in soil samples collected on the Diamond Shamrock/Henkel property
 - (a) In the Underground Fuel Oil Storage Area (B-12),
 - (b) In Tank Farm 3 across the flume from the production pond (B-14, B-119, and B-121),
 - (c) Near Building 4 (B-18),
 - (d) Near former underground storage tanks near Building 6 (B-19, B-21, and B-22),
 - (e) Near and in the Equalization Pond (B-52, B-53, and B-59),
 - (f) In the Alternate Basin (B-65 and B-72),
 - (g) In the Zinc and Sulfur Area (B-73)
 - (h) Near Tank Farm 2 (B-133),
 - (i) Near Building 12 (B-38, B-140, B-141, and B-146).
 - (4) More likely than not, Diamond Shamrock/Henkel used and disposed of PAH laden materials that eventually made its way onto the Ventron/Velsicol property.
- e. The highest concentrations of phthalates were found in the filled, undeveloped area of the Site (Exhibit 5).
 - 1) Outflows from the vicinity of the Randolph Products property drained onto the Ventron/Velsicol Site.
 - a) Aerial photography (1957, 1959, and 1961) shows a system of drainage ditches from the Randolph property infiltrating the areas on the Ventron/Velsicol property.
 - b) Sampling locations in close proximity to these ditches and interconnecting small meandering streams were SS-16, SS-17, SS-18, SS-24, SS-30, TP-8, TP-10, TP-11, TP-12, TP-13, TP-14, and TP-18.



- c) All of these sampling locations displayed elevated concentrations of phthalates.
 - d) Phthalates are components of many paint products.
 - e) Surfactants are also components of many paint products and would facilitate the transport of suspended particles.
 - f) At least a portion of the phthalate contamination in this area is, more likely than not, a result of the drainage from the Randolph Products property.
- 2) Sludges from the Sewage Treatment Plant were used to fill portions of the Ventron/Velsicol Site.
 - a) Sewage sludge is reported to contain elevated concentrations of phthalates, especially bis-2-ethylhexyl phthalate.
 - b) Sewage sludge was apparently deposited and spread in the vicinity of sampling locations SS-18, SS-24, TP-8, and TP-12.
- f. Contamination does not appear to migrate from the northern portion of the Ventron/Velsicol Site to the southern portion of the Site by way of Berry's Creek.
 - 1) Inspection of Exhibits 1 through 5 indicates that little or no contamination exists in Berry's Creek east of the Site for any of the compounds.
 - 2) Contaminants are more concentrated with distance from Berry's Creek and closer to the developed areas.
 - 3) It is highly unlikely that the effect of tidal action would be to concentrate contaminants in the upper reaches of streams and ditches.
 - 4) More likely, the effect of tidal action would be expected to disperse contaminants over a wider area.
 - 5) The observed patterns at the Ventron/Velsicol Site suggest that contaminants were not transported great distances from their sources regardless of tidal effects.
- g. In summary,
 - 1) The area south of the stream known as the Diamond Shamrock/Henkel outlet ditch does not appear to have been the subject of filling or dumping. Consequently, contamination found in this area of the Site is, more likely than not, due to transport of chemicals from the surrounding properties, particularly from the Diamond Shamrock/Henkel production pond.
 - 2) Randolph Products contributed to the phthalate contamination through drainage ditches onto the western portion of the Ventron/Velsicol Site.
 - 3) The filling of areas with sewage sludge resulted in additional contamination with phthalates on the Ventron/Velsicol Site.
 - 4) Contamination patterns on the Ventron/Velsicol Site are not consistent with the concept that compounds originated from the northern portion of the site, migrated by way of Berry's Creek towards the southern portion of the site,



and then entered the Diamond Shamrock/Henkel inlet and outlet ditches through tidal, or any other, actions.

6. **EXHIBITS**

In addition to the following exhibits, Dr. Smith may rely on data and exhibits from other experts retained by Taft, Stettinius, & Hollister on behalf of their clients, Morton International, Inc., and Velsicol Chemical Corporation, as well as by experts for Diamond Shamrock Chemicals Company, Randolph Products Company, and Henkel Corporation.

Exhibit 1 - Zinc

Exhibit 2 - Arsenic

Exhibit 3 - Manganese

Exhibit 4 - Carcinogenic PAHs

Exhibit 5 - Total Phthalates

7. **QUALIFICATIONS/EXPERIENCE/PUBLICATIONS**

Credentials

- Ph.D. Organic Chemistry - Iowa State University (1964)
- B.A. Chemistry, with honors thesis - Williams College (1960)
- N.I.H. Postdoctoral Fellowship, Organic Chemistry - University of Illinois (1965-66)
- Visiting Lecturer, General and Organic Chemistry - University of Illinois (1966)
- Assistant Professor, Organic and Analytical Chemistry - Eastern Michigan University (1966-68)
- N.I.H. Postdoctoral Fellowship, Organic Mass Spectrometry - Cornell University (1968-69)
- American Chemical Society
 - Chairman of the Mass Spectrometer discussion group, 1970-71
- American Society for Testing and Materials
 - Committee D-19 on Water (1979 to present)
 - Committee D-18 on Soil and Rock (1993 to present)
- American Society of Mass Spectroscopists
- Association of Official Analytical Chemists
 - Technical Division on Reference Materials
- National Water Well Association